Montana Department of Public Health & Human Services
Wild Mushroom Poisoning Fact Sheet

WILD MUSHROOMS
THE RISK OF POISONING

How ARE mushrooms identified? Can I learn to do it?

For most species of wild mushrooms, identification is an exacting process that requires extensive knowledge. Before making a positive identification, mycologists look closely at the color, gills, spores, stalks and base portion of the mushroom. Spores are examined under a microscope to detect differences. The mycologist may also consider where the mushroom was growing, such as in the woods, on a lawn or on dead wood, before making an identification. Because of the involved process required to accurately identify a mushroom, it is impossible to do it from a description over the phone. Even common field mushrooms have a poisonous "cousin".

Mushroom poisonings are almost always caused by ingestion of wild mushrooms that have been collected by nonspecialists, or which have been identified by reliance on some folk method of distinguishing poisonous from safe species.

For some types of mushrooms, such as the morels, which are popular in western Montana, identifying can be learned by taking an identification course, or by obtaining some training from someone experienced in morel identification. There are 2 or 3 characteristics of true morels which can be readily recognized and which distinguish the edible true morels. Many recreational mushroom collectors have learned to reliably distinguish morels (*Morchella sp*.) from their poisonous counterparts. Training classes in morel harvesting are sometimes available. For more information contact the Western Montana Mycological Association (WMMA) at P O Box 7306 in Missoula 59807. For information on mushroom harvesting in your area, contact the U.S. Forest Service in your area, and speak with a recreation specialist. The Helena Ranger District is 406.449.5490. In the Kalispell area, try 406.758.5204, in Libby try 293.6211. In most areas a permit is required, and some training may be available.

What symptoms do poisonous mushrooms cause?

Even non-poisonous wild mushrooms have caused illnesses--especially in people with allergy, or who have never eaten that particular type of mushroom before. Simply eating too much of an edible mushroom can cause symptoms. Eating uncooked morels (even the species regarded as edible), such as *Morchella spp*., has caused many cases of illness—they should be cooked before eating, as they may contain a certain amount of toxin which is driven off during cooking.

Among the poisonous wild mushrooms, there are a variety of mushroom toxins, discussed here briefly by type of toxin, symptoms and some examples of the implicated species of mushroom. Each category causes different symptoms. *Protoplasmic poisons* cause the generalized destruction of cells, followed by organ failure, while *neurotoxins* cause neurological symptoms such as sweating, convulsions, coma, hallucinations, excitement, manic behavior, depression. The disulfuram-like toxins are generally not fatal, and produce no symptoms unless alcohol is consumed within 3 to 5 days after eating, in which case a short-lived acute toxic syndrome is produced. The first three categories detailed below are protoplasmic poisons, and are the most likely to be fatal. Neurotoxins are discussed in #'s 4, 5, and 6.

1. CYCLOPEPTIDES (Amanitins): This type of protoplasmic poisoning may be caused by any of several species which produce a family of cyclic octapeptides called amanitins. They include the Death Cap or Destroying Angel (*Amanita phalloides, A. virosa*), the Fools Mushroom (*A. verna*), the Autumn Skullcap (*Galerina autumnalis*) and others. After a characteristic latency period of 6 to 48 hours, usually 10-14 hours, symptoms begin with sharp abdominal pains, followed by persistent vomiting, lack of urination and diarrhea, often containing blood and mucous. In three to four days, the patient begins to worsen with prostration, pain-caused restlessness and symptoms of kidney and liver failure. Deaths occur in 50 to 90% of cases, often within 48 hours. If recovery occurs, it generally requires at least a month and involves enlargement of the liver. There is no known antidote; immediate evacuation of the gastrointestinal tract, fluids, hemodialysis, slurry of activated charcoal, and supportive measures may help.

2. ORELLANINE: Protoplasmic poisoning can be caused by ingestion of Sorrel Webcap (*Cortinarius orellanus*) and some of the 800 other species of *Cortinarius*. The Sorrel Webcap is not easily distinguished from nonpoisonous webcaps belonging to the same distinctive genus, and all *Cortinarius* should be avoided. Orellanine is a bipyridine, as in the herbicide paraquat, and inhibits the activity of the enzyme alkaline phosphatase in kidney cells. The latency period is very long - symptoms begin 3 to 11 days after ingestion. They include a severe burning thirst, lack of appetite, headache, excessive urination, and sometimes nausea. Symptoms may include muscle pain, chills and unconsciousness. Orellanine destroys kidney tubules. In severe cases, kidney failure and death may occur several weeks later. In less severe cases, recovery may require several months.

3. MONOMETHYLHYDRAZINE: Protoplasmic poisonings may also be caused by consumption of False Morels (*Gyromitra esculenta, G. Gigas)* and *Helvella* species which contain the volatile hydrazine derivative (MMH). There is a characteristic latency period which may be 6 to 9 hours, after which the patient experiences a feeling of fullness in the stomach followed by vomiting, headache and sometimes watery diarrhea. Fatigue, cramps and intense pain in the liver and stomach regions occur, followed by jaundice. Seizures occur in severe cases. Sensitivity to this poison varies among individuals, but damage to the liver occurs even in the absence of gastro-intestinal symptoms. A similar syndrome results from consumption of Early False Morels (*Verpa bohemica*) which is shown in the graphic at the end of this article. Uncooked edible morels also contain small amounts of this toxin, but it is driven off in the process of cooking the morels. MMH may cause cancer.

4. IBOTENIC ACID-MUSCIMOL: (Neurotoxin) Produced by both the Fly Agaric and Panthercap (*Amanita sp*). Ibotenic acid in the fungus converts to muscimol when the plant is dried out, making dried mushrooms more potent than fresh ones. A state resembling alcohol intoxication develops 30 to 60 minutes after ingestion. Tribal religious rites in Siberia involved the use some of these species. Confusion, muscle spasms, delirium, and visual disturbances, lasting for about four hours, occur following the intoxicated state. Drowsiness, dizziness and sleep are followed by a period of

hyperactivity, excitability, illusions, and delirium. Fatalities are rare in adults, and recovery is usually rapid, but accidental consumption of large quantities by children may cause convulsions, coma, and other neurologic problems for up to 12 hours.

5. MUSCARINE-HISTAMINE: (Neurotoxin) This type of poisoning is associated with ingestion of *Inocybe* or *Clitocybe* species. The toxicity is caused by the presence of muscarine in the mushroom and is characterized by what is known as PSL syndrome = perspiration, salivation and lachrymation (watery eyes). Profuse sweating starts 20 minutes to 2 hours after ingestion, symptoms include increased salivation, watery eyes, blurred vision, pinpoint pupils, diarrhea, decreased heart rate and blood pressure, and asthmatic breathing. (The sweating, drooling, diarrhea and watery eyes do NOT occur with other types of mushroom poisonings.) Symptoms resulting from ingestion of these psychotropic fungi also include abdominal pains, bloody stools, manic behavior and stupor. With large doses, symptoms include severe nausea, diarrhea, blurred vision and labored breathing. Intoxication usually subsides in 2 to 3 hours. Rarely, a death may occur from cardiac or respiratory failure.

6. PSILOCYBIN POISONING: (Neurotoxin) These psychotropic mushrooms can alter consciousness and produce a syndrome similar to alcohol intoxication. They include the genera *Psilocybe, Panaeolus, Copelandia, Gymnopilus* (sometimes mistaken for Chantrelles), *Conocybe* and *Pluteus.* Several of these fungi were utilized for their psychotropic effects in religious ceremonies of certain native tribes, a practice which dates to the pre-Columbian era. They are often included in the category of LBM's (little brown mushrooms), and some also contain amatoxin. An intoxicated or hallucinogenic condition begins between 30 and 60 minutes after ingestion. The mood may be apprehensive (anxious) or pleasant. The person may experience compulsive movements and uncontrolled laughter. Ingestion of these small brown mushrooms is less likely to be accidental. In children, a high temperature (102-106½ F) and seizures may develop, with large doses-- convulsions, coma and death.

7. COPRINE: (Classified as a Disulfuram-like poisoning.) The Inky Cap Mushroom is often responsible for this type of poisoning (*Coprinus atramentarius*) but other species have been implicated. Coprine, an unusual amino acid is converted to cyclopropanone hydrate, which interferes with the breakdown of alcohol. Symptoms will occur if this toxin is eaten by a person who drinks alcohol beverages within the 5 days after ingestion of the mushroom. Intoxication is characterized by flushing of the face and neck, headache, a metallic taste in the mouth, numbness of the hands and feet, palpitations, and an increased heart rate. Symptoms sometimes include vomiting. The picture is complicated by the fact that the mushroom is generally considered edible (no illness results among persons who do not consume alcoholic beverages).

8. GASTROINTESTINAL: A variety of species contain GI toxins, including Green Gill (*Chlorophyllum molybdites*), Gray Pinkgill (*Entoloma lividum*), Jack O'Lantern (*Omphalotus illudens*), Naked Brimcap (*Paxillus*), Sickener (*Russula emetica*), Early False Morel (*Verpa bohemica*), Horse Mushroom (*Agaricus arvensis*) and Pepper Bolete (*Boletus piperatus*). A distinguishing characteristic of this kind of poisoning is a rapid onset--within 30 to 90 minutes of ingestion, sudden severe vomiting and mild to severe diarrhea with abdominal cramps occur. Symptoms generally last 5 to 8 hours, deaths are rare. In children, symptoms may lead to dehydration severe enough to require hospital treatment. The chemical nature or action of the toxins is not well understood.

What should I do if I've already eaten toxic mushrooms?

DO NOT WAIT FOR SYMPTOMS TO APPEAR!

Don't be misled into thinking the mushrooms are safe just because illness does not appear within a few hours. Symptoms may not develop until several days or months after the mushroom was eaten. Consult with a physician or medical care specialist if you have consumed poisonous wild mushrooms or if there is reason to suspect that you may have. There are treatment options for the physician, but there is no antidote, and that is why expert identification is so critical. If you have saved some of the mushrooms in question, they may be tested for the presence of some kinds of toxin, or they may be identifiable. The physician may want to know what type of mushrooms you thought you were picking.

If a significant amount of time passes after the ingestion, treatment at a hospital may be required. Mushroom ingestions can be life threatening and emergency treatment may be needed. It is important to note: having eaten a certain wild mushroom on previous occasions without illness symptoms does not mean that these mushrooms are safe. Even if someone has eaten the mushroom one or many times before, several months or even years later, a person may discover that they have been damaging their liver by repeatedly eating this seemingly safe plant, and suddenly they experience complete liver failure, without having previously been ill. At this point, a liver transplant and anti-rejection drugs are the best options, if a liver is available. The only way avoid such tragedy if you consume wild mushrooms, is to rely on expert identification, or to buy cultured mushrooms from local grocery markets.

How do I avoid accidental mushroom poisoning?

Even non-poisonous mushrooms can make you ill!

All unidentified wild mushrooms should be considered to be potentially dangerous. Those mushrooms that are edible from one geographic area may be poisonous when they grow in other geographic areas. Even some non-poisonous types can become contaminated and partially decompose, causing symptoms.

Morels are easier to identify than some other types, but unless the mushroom has been identified by a recognized expert or by someone competent in identification, poisoning can result. There is no serum or antidote for mushroom poisoning. There are many improvements in the kinds of care available, and the chances for recovery are better than ever, but prevention is best. For wild mushroom species other than morels, we recommend that you rely on nothing less than expert identification.

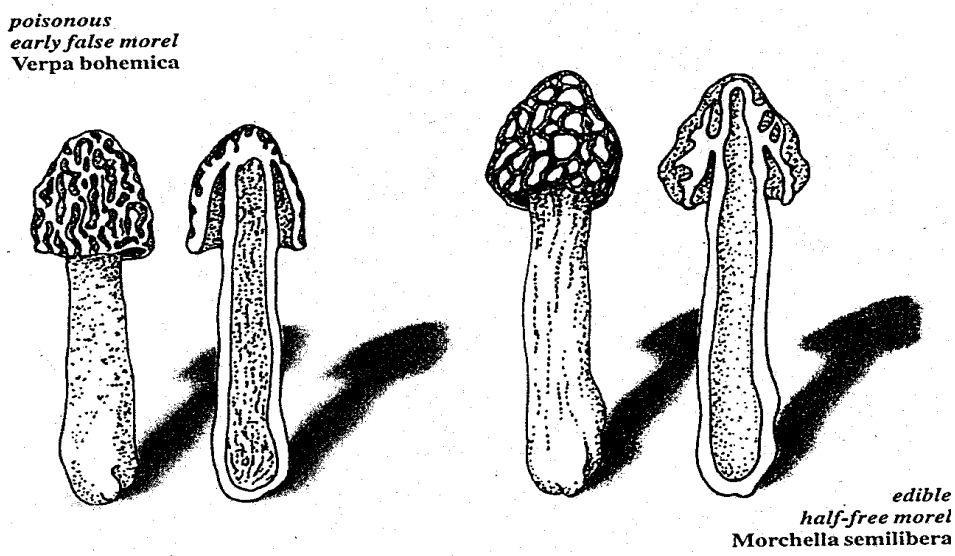
Persons with allergies can become ill from edible mushrooms if they are sensitive to the species. Also, eating too much of a new variety can make you ill, even if the mushroom is safe and edible.

Springtime in Montana often means wild mushroom season, and rainy springs are especially conducive to mushroom growth. Morels have become extremely popular for mushroom gathering in western Montana, but in order for them to be safe, they should be cooked--in a well ventilated area--before eating, and the identifier should be competent.

We recommend that parents teach small children not to taste or handle wild mushrooms growing outdoors. Mushroom gathering is great fun and recreation for those who love wild mushrooms and who have become competent in identifying morels or have expert identification available for other species.

Our general recommendations are:

- **Above all, use only mushrooms that have been identified by a competent identifier or expert.**
- **Eat only clean, firm, fresh, undecayed mushrooms, free of insects.**
- **Do not eat wild mushrooms in large quantity.**
- **Mushroom hunters are advised to strictly avoid:**
  - **any mushroom that looks similar to an amanita, i.e., (parasol shape, white gills);**
  - **all little brown mushrooms (LBM's);**
  - **all false morels, including the early false morel (*v. bohemica).***



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